

We claim:

1. A fusion protein for delivery of a compound of interest into a cell, comprising a membrane penetrating peptide attached to a compound of interest.

5 2. The fusion protein according to claim 1, wherein the membrane penetrating peptide is derived from a nuclear localization sequence, overlaps with a nuclear localization sequence of a mammalian or yeast protein or comprises a sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine.

10 3. The fusion protein according to claim 2, wherein the nuclear localization sequence is derived from a nuclear protein or transcription factor.

4. The fusion protein according to claim 3, wherein the transcription factor is a Period protein.

15 5. The fusion protein according to claim 4, wherein the Period protein is a human Period protein.

6. The fusion protein according to claim 5, wherein the mammalian Period protein is human Period1 protein.

20 7. The fusion protein according to claim 2 wherein the membrane penetrating peptide comprises the sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine.

8. The fusion protein according to claim 7, wherein n is an integer 1 to 4.

9. The fusion protein according to claim 8, wherein n is an integer 1 to 2.

10. The fusion protein according to claim 1, wherein the compound of interest is a peptide, protein, chemical entity, nucleic acid, or any modified form thereof.

25 11. A method of delivering a compound of interest into a cell, comprising contacting a cell with a fusion protein according to claim 1.

12. The method of delivering a compound of interest into a cell *in vitro*, comprising contacting a cultured cell with a fusion protein according to claim 1.

30 13. The method of delivering a compound of interest into a cell *ex vivo*, comprising contacting a cell with a fusion protein according to claim 1 and introducing the cell into the body of a patient.

14. The method of delivering a compound of interest into a cell *in vivo*, comprising administering to a patient a fusion protein according to claim 1.

15. A method for identifying a membrane penetrating peptide, wherein a peptide comprises a sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine, by generating a conjugate peptide comprising the sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine, with a detectable protein, adding the conjugate peptide exogenously to a cell and determining if the conjugated peptide is located within the cytoplasm and/or nucleus of the cell.

16. A method for identifying a membrane penetrating peptide, wherein a peptide comprises a sequence derived from or overlapping with a nuclear localization sequence of a mammalian or yeast protein, by generating a conjugate peptide comprising the part or all of the nuclear localization sequence with a detectable protein, adding the conjugate peptide exogenously to a cell and determining if the conjugated peptide is located within the cytoplasm and/or nucleus of the cell.

17. The method of delivering a compound of interest into a cell, comprising administering to a cell a fusion protein according to claim 1, wherein the membrane penetrating peptide comprises a sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine.

18. A fusion protein for delivering a compound of interest into a cell, wherein the fusion protein comprises a membrane penetrating peptide comprising a sequence  $-(X-X-X-X)_n-$  where n is an integer 1 to 7, and X each time is independently selected from the group consisting of arginine, histidine or lysine, and a compound of interest.

19. The fusion protein of claim 18, wherein the compound of interest is directly chemically attached to the membrane penetrating peptide or by a linker.

20. The fusion protein of claim 19, wherein the linker is an amino acid linker or a polypeptide linker.

21. The fusion protein of claim 18, wherein the membrane penetrating protein is produced by recombinant technology, chemical synthesis or degradation of a precursor protein.